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Study of drying process in full-size core by nuclear magnetic resonance method

Fattakhov A., Kosarev V., Skirda V., Doroginitskii M.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The paper describes the results of study of the nuclear magnetic resonance (NMR) signal distribution along the axis of full-size core depending on the time of its extraction from the core tube. It was detected the presence of thin interlayers characterized by the significant heterogeneity in the distribution of the NMR signal amplitude. This fact demonstrates the need to develop appropriate criteria when selecting the standard samples for the study of reservoir properties and creation of relationships between petrophysical parameters. It was conducted the study of kinetic of NMR signal loss during the period in about 20 days from the time of core material extraction from the well. The experiment showed the heterogeneity in the distribution of the characteristics of the fluid evaporation process along the core. Two types of kinetic dependencies were revealed. Form one of them is nearly exponential dependence. Another form characterized by anomalous behavior consisting in that at the initial time part the fluid evaporation from the core is carried out slowly and only after about 150 hours it is observed the acceleration of the evaporation process and the transition of the kinetic curve to exponential type. It is suggested that such behavior of the kinetic dependence may be due either to the heterogeneity in the distribution of pores by core volume in the study area or the shape of pores, for example, the presence of dead-end pores.

Keywords

Carbonates, Drying process, Fluid saturation, Full-size core, Nuclear magnetic resonance, Porosity